

Chemical Synthesis: Turkevich Method

Used to synthesize silver nanoparticles ranging from 15-30nm.

Protocol:

1. Fill a 50 mL falcon tube with ddH₂O.
2. Weigh out 3.6 mg (0.0036 g) of AgNO₃ powder.
 - Light sensitive - limit light exposure by covering with aluminum foil
3. Measure 20 mL of ddH₂O in a 25 mL graduated cylinder. Pour the water into a 100 mL beaker.
4. Add the AgNO₃ solid to the ddH₂O in the beaker and place a stir bar into the solution to mix it.
5. On the hot plate, stir the solution with the stir bar and boil it to fully dissolve the AgNO₃. Place a watch glass on the opening of the beaker to prevent vapours from escaping during boiling.
 - Light sensitive - limit light exposure by covering with aluminum foil
 - During this step, nanoparticle synthesis should occur
6. Measure 4 mL of 1% sodium citrate into a 10 mL graduated cylinder.
 - If the 1% sodium citrate solution is not prepared, 5 mL of sodium citrate solution can be made:
 - A. Weigh out 0.05 g (50 mg) of sodium citrate solid.
 - B. Using a 10 mL graduated cylinder, measure 5 mL of ddH₂O and pour it into a conical tube.
 - C. Add the sodium citrate to the conical tube and cap the tube.Mix the solution by inversion until the solid dissolves.
7. Add the sodium citrate to the AgNO₃ solution dropwise into the beaker with continuous stirring.
 - Keep stirring until a yellow-brown color change is observed, at about 10 min - indicating citrate attachment to Ag nanoparticles
8. Remove the solution of citrate-coated nanoparticles from the hot plate and let it cool down at room temperature.
9. Store in 4°C fridge.

Source: Konnova, S. A., Danilushkina, A. A., Fakhrullina, G. I., Akhatova, F. S., Badrutdinov, A. R., & Fakhrullin, R. F. (2015). Silver nanoparticle-coated "cyborg" microorganisms: rapid assembly of polymer-stabilised nanoparticles on microbial cells. *RSC Adv.*, 5(18), 13530-13537. Retrieved from <http://pubs.rsc.org/en/content/articlehtml/2015/ra/c4ra15857a>